A SURVEY OF THE DIFFICULTIES AND TEACHERS' ATTITUDES TOWARDS THE INTRODUCTION OF MICROCOMPUTERS FOR EDUCATIONAL PURPOSE IN HONG KONG SECONDARY SCHOOLS

by

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under the supervision of

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A thesis submitted to the
School of Education of the
Chinese University of Hong Kong
in partial fulfilment of
the requirements for the
Degree of Master of Arts in Education

1983

ACKNOWLEDGEMENTS

The author would like to express his deepest gratitude to his Supervisor, Dr. Cheng Shiu Ching, for his valuable advice and encouragement. Many thanks are extended to Dr. Lo Lam Fat, Mr. Joseph, Shin Ting Fu, Mr. Chung Choi Man and Mr. Law Hing Chung for their helpful comments and suggestions.

The author would also thank the principals and teachers of the following schools for their enthusiastic participation in the study:

1. Concordia Lutheran School
2. Gertrude Simon Lutheran College
3. Ju Ching Chu English College, Chuen Wan
4. Ju Ching Chu English College, Tuen Mun
5. Ju Ching Chu English College, Yuen Long
6. Lingnan Dr. Chung Wing Kwong Memorial Middle School
7. Munsang College
8. Po Leung Kuk Wu Chung College
9. St. Mary's Canossian College
10. St. Paul's Secondary School
11. Tang King Po School
12. Wah Yan College, Hong Kong
13. Wah Yan College, Kowloon
14. Y.M.C.A. College

The author would like to thank the Chairman, Mr. Peter Fan, and the members of the Hong Kong Association of Careers Masters, for their enthusiastic participation in the pilot study. The author would also thank the Chairmen of the Hong Kong Association for Computer Education, Mr. Lai Suk Ming and Mr. Shin Ting Fu, Joseph for their permission to perform the study under the title of the association. Many thanks are also extended to some members of the association, for their participation in the discussion on the validation of the instruments. Special thanks should be given to the colleagues of the researcher, Mr. Tong Yi Hung and Mr. Wong Chi Keung, Mark, for their patience in reading and correcting the manuscript; and to other teachers who kindly worked out the difficulties they would face. Finally, the author would like to thank his wife and two daughters for their acceptance and understanding which enabled him to spend most of his spare time on his microcomputers and in the Computer Centre of the Chinese University for the whole year.

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Abstract

With the introduction of Computer Studies in secondary schools in Hong Kong, and the sharp decrease in price of microcomputers, more and more schools will install microcomputers. As more teachers are exposed to computers, more will tend to use them in the teaching of their subjects. The purpose of this study was to find out how sex, number of years of teaching experience and major teaching subjects affect the teachers' participation in computer training, their experience in using computers, the dificulties in using computers, their intent to use them, and their attitudes towards in-service programs on computers.

The method used in this study was mainly a survey research. A questionnaire of four instruments was administered to 201 male and 221 female teachers of all teaching subjects from fourteen schools of three types - boys', girls' and co-educational.

Descriptive statistics and crosstabulations revealed:

1) 28.9% of teachers got some computer training. Among them, 59.0% were male and 53.3% were science teachers.

2) 38.4% had used computers before. Among them, 56.8% were male and 49.4% were teachers with four to eleven years of teaching experience. Among teachers who had not used computers before, 64.6% were female, 84.0% had more than 20 years of teaching experience and 66.1% were arts teachers.

3) The reliability coefficients of the instruments were:

a) DIF -- Alpha=.883, Std Item Alpha=.886

b) INT -- Alpha=.788, Std Item Alpha=.786

c) ATT -- Alpha=.723, Std Item Alpha=.724

4) The 3-way ANOVA revealed that the majority of the teachers found it difficult to teach with computers. They had high intention to use computers and positvie attitudes towards in-service programs on computers. Teachers with 11-20 years of teaching experience in fine arts subjects and those with more than 20 years of experience in arts subjects found the teaching with computer least difficult. Female teachers with more than 20 years of teaching experience had the lowest scores in INT and ATT.

5) A posteriori tests showed that teachers with computer training and experience in using computers had favourable intention to use computers and positive attitudes towards in-service programs on computers, while those with computer training but without practice found it most difficult.

It was recommended that more computers should be provided and more seminars on computers should be held by teachers within schools so that more teachers are exposed to computers.

CHAPTER I: INTRODUCTION

Statement of the Problem

The breakthrough of the technology in making large scale integrated chips for computing machines brings forth the advent of microprocessor upon which dedicated and general purpose microcomputers are based. Because of the widespread applications of various kinds of computers, from large computers used in banks and government to small, dedicated ones used in Mass Transit Railway (MTR) and Automatic Teller Machines, people in the street become aware of the importance of computer in daily life. The ability to use computers is as basic and necessary to a person's formal education as reading, writing, and arithmetic (Luehrmann, 1980). In 1978, The National Council of Supervisors of Mathematics recommended that computer literacy should be put into the list of ten basic skills for all citizens. In Hong Kong, the demand for computer education in secondary schools is also very strong (Tung, 1980). After innumerable difficulties had been surmounted, the Computer Studies Pilot Scheme was finally implemented in September, 1982. There were thirty schools joining the pilot scheme, but in addition to these, there are more than forty schools, though not in the pilot scheme, offering their Form 4 or Form 5 students this subject. More

schools are expected to introduce Computer Studies into their school curricula. The support from the public is very strong, concerned educators and society leaders are urging the introduction of the subject to all secondary schools. In each pilot school, there are at least ten sets of microcomputers. In non-pilot schools, because of the regulations set by the Examinations Authority, there must be at least nine sets of microcomputers for a class of forty. As more computers are installed in schools, more teachers are able to gain access to them. Since these computers are used only in a few periods of Computer Studies and after school, many teachers are tempted to use them in their teaching. The interest to use Computer Assisted Instruction in subjects other than Computer Studies is rising among teachers.

The development in both the hardware and software of microcomputers is so rapid that microcomputers become very easy to use and very versatile. Many of them have high-resolution colour-graphic displays, some of them can be interfaced with voice-synthesizer for voiced output and analogue circuit for voiced input. The prophecy that in 1990, all classrooms in developed countries will be electronically-controlled: teachers will be replaced by computers, and information and references will be supplied by computers (Cheng, 1982), has solid grounds. The availability of low-cost homebrew microcomputers, the Chinese character

generator card for Apple II computers, and simple to use educational languages, such as PILOT, LOGO, etc., has sped up the applications of microcomputers for educational use.

"Core curriculum has long been viewed as a better replacement for subject based curriculum in schools" (Cheng, 1982). With Integrated Science taking the lead, other core curricula are in progress. Since teaching materials of several subjects are integrated together to form a single teaching unit, it would be a burden for a teacher teaching it. With the help of computers, reference materials and other data can be fed into the computers and retrieved very easily and quickly by teachers and students. Computer Managed Learning is a great help in the development of Core Curriculum.

In the past, most of the teachers were ignorant of the development in CAI and most of the specialists developing CAI were not trained teachers, and were often ignorant of the basic principles of education. Many teachers thus found that many of the CAI programs available were not good enough to be used in class. But the situation has nowadays been changed. Series of educational microcomputer programs developed by school teachers and professional programmers are available in the market today (Ginn, 1983). As the applications of computers in education increase, an anxiety on computers arises among teachers. Anxious teachers may react diffe-

rently to release their anxiety: Some tend to reject the applications of computers in school activities. These teachers usually think that it is very difficult to operate computers and use them in their teaching. Other teachers may seek opportunities to acquire computer knowledge. These teachers usually have positive attitudes towards in-service programs on computers and their intent to use computers for educational use are usually high. Teachers' active participation and positive attitudes are essential to the success of the diffusion of this new technology in education. If teachers' opinions can be revealed, proper actions can be taken to release teachers' anxiety and promote the use of these intelligent teaching aids in schools.

Review of Related Literature

Introduction of Computers for Educational Purpose

The application of computers for educational purpose started very early in the universities. Owing to the extremely high cost of main frame computers, applications of computers in secondary level started quite late. The commercial microcomputers appeared in the early nineteen seventies. Popular Electronics offered the world's first "minicomputer" kit in 1975 (Roberts, 1975), which stimulated the interest of many electronics hobbyists. Many physics teachers who were

also electronics enthusiasts began their studies in microcomputers. Many of them shared their experience with other teachers in how they applied microcomputers in their teaching of physics (Harvey, 1978). The advancement of LSI technology caused a sharp decrease in the cost of microprocessor and related chips, and low-cost microcomputers became available. More microcomputers were introduced into secondary schools (Campbell, 1979). Many teachers started to convince others that microcomputers could be used in the classroom as a teaching aid (Payne, 1979), a tutor, or an assistant in the laboratory to take data (Leung, 1980). It was predicted that by the year 1984, there would be millions of microcomputers in schools, colleges, and universities, with an even greater number available for educational use in the home (Dwyer, 1980). The low-cost local-made AP II caused a computer fever among science teachers. The introduction of the Computer Studies Pilot Scheme was another stimulus. As more teachers are exposed to microcomputers, more will tend to use them.

Teachers' Difficulties in introdcing Computers for Educational Use

Application of computers for educational use is an innovation in education. It is unanimously agreed by teachers that the computer is a powerful instructional tool, yet it has met resistance among teachers (Anastasio, 1972). They

reject it through ignorance, anxiety, laziness to learn and past experience (Etchholz and Rogers, 1964). It was also found that teachers rejected innovation because the resources and software were insufficient (Eastwood, 1978; Roberts, 1978). In a study of the resistance to the introduction of a high school guidance program, it was found that most of the new teachers were favourable to the change while the majority of the experienced teachers resisted the change (Atwood, 1964). But Pincus (1974) suggested that many new teachers simply would not accept the responsibility to make appropriate changes in behaviour patterns needed to accept innovation. It was pointed out that beginning teachers' self-reported anxieties and concerns centered around their ability to maintain discipline in the classroom (Coates, 1976). It is a common belief among teachers that science teachers would find it less difficult to use computers than arts teachers. The argument is that computers, being scientific products, require very complicated mathematical manipulations in order to control them. The recent developments in microcomputers greatly simplify the procedures in using them and the advent of the Chinese card attracts the attention of the teachers teaching Chinese. Many arts teachers begin to learn computer operations.

Teachers' Intent to Use Computers

It was reported that teachers who were anxious about the

introduction of computers tended not to interact with computers (Levin, 1972). Computer anxiety among teachers is one factor that is inhibiting the potential benefits of computer in education (Rohner & Simonson, 1981) It was suggested that based on individual and group scores, decision can be made as to what in-service programs would be for each teacher or group of teachers (Rohner & Simonson, 1981).

Teachers' Attitudes towards In-service Programs on Computers for Educational Purpose

In Hong Kong, as in many other countries in the world, most of the teachers teaching Computer Studies are not well-trained. As computers become more and more popular, teacher training in instructional use of computers is necessary (Hansen, 1970). In some countries, study-course of short cycle-time was thought to be a possible solution (Lázár, 1978). In Hong Kong, teachers obtained their knowledge in computer through extramural and special courses in the universities and the Polytechnic, short courses organized by computer societies such as Hong Kong Association for Computer Education (HKACE) and the Microcomputer Club of the Hong Kong Professional Teachers' Union (HKPTU). Researchers found that teachers seemed to be conditioned by their past experiences and related peer group norms to react negatively towards in-service programs in general (Ainsworth, 1976; Joyce et al., 1976; Brimm & Tollet, 1974). But for teachers teaching

Computer Studies, it seems to be the opposite. Many teachers attend courses and seminars. The attitudes of teachers towards in-service programs on computers are important factors in the success of the introduction of computers for educational purpose. If teachers have positive attitudes towards in-service programs on computers, more in-service programs could be conducted and more teachers will have computer knowledge so that the educational innovation -- computers for educational purpose -- may diffuse more rapidly. In a survey on how teachers feel about in-service education, it was found that useful in-service experiences start with the assumption that teachers can be resources to each other and, therefore, these experiences provide opportunities for teachers to share ideas and resources with each other (Zigarmi, 1977). In a study on the attitudes of teachers towards ETV, Leung (1977) found that the majority of the teachers believed that in-service training in ETV is important to them (Leung, 1977). Trueblood (1981) suggested that gender, subject taught, number of years of teaching experience and amount of educational training completed were some of the variables which could account for the difference observed among teachers with regard to their attitudes towards in-service program.

Purpose of Study

The purpose of this study is to find out the teachers' difficulties in teaching with computers, their intent to use computers for educational purpose and their attitudes towards in-service programs on computers. It is hoped that this study would provide some information and help in the introduction of computers for educational purpose in secondary schools.

Definitions

Teachers' Difficulties (DIF) in Introducing Computers for Educational Purpose

In this study attention is focussed on the following difficulties:

a) to operate the computers with confidence,

b) using computers to realise the objectives and aims of the lesson,

c) to write teaching programs with proficiency,

d) to avoid clashes in the use of computers, when teachers of other subjects also use Computer Assisted Instructions in their teaching,

e) to keep the class in discipline when students are at the terminals,

f) to acquire appropriate textbooks and resources.

High score indicates that the subject has faced great difficulties in using computers for educational purpose.

Teachers' Intent (INT) to Use Computers

The instrument was designed by Rohner & Simonson (1981), It was adapted by the researcher to measure the teachers' intent to use computers in their teaching. High score indicates favourable intent to use computers.

Teachers' Attitudes (ATT) towards In-service Programs on Computers

This variable shows the subject's feeling on in-service programs on computers. High score means that the subject has positive attitudes and welcomes the in-service program for training of teachers.

Hypotheses

The null hypotheses of this study are stated as follows:

1. There is no significant difference in the teachers' difficulties towards teaching with computers, between teachers of different sexes, between teachers of different number of years of teaching experience, and between teachers of different major teaching subjects.

2. There is no significant difference in teachers' intent to use computers for educational use, between teachers of

different sexes, between teachers of different number of years of teaching experience, and between teachers of different major teaching subjects.

3. There is no significant difference in teachers' attitudes towards in-service programs on computers for educational use, between teachers of different sexes, between teachers of different number of years of teaching experience, and between teachers of different major teaching subjects.

CHAPTER II: METHOD

The Research Method

Survey method was used in this study. A questionnaire containing four instruments (see Appendix A) was developed by the researcher. The questionnaires were administered to all subjects in the sample of this study.

Sampling

This study was designed to measure the teachers' difficulties and intent to use computers, and their attitudes towards in-service programs on computers for educational purpose. To ensure that the sample contained approximately equal number of male and female teachers, fourteen schools were selected which included boys', girls' and coed. schools. 581 questionnaires were sent, of which 422 were returned. The percentage of return was 72.6%. Among these 422 subjects, 201 were male and 221 were female. 113 of them were teaching science subjects, 244 were teaching arts subjects, 59 were teaching fine arts, and 6 did not indicate their teaching subjects.

Instruments

The four instruments embedded in the questionnaire of this study were:

Instrument to collect Personal Data

This instrument was constructed to collect the personal data of the subjects. It consisted of items to find out the subjects' a) Sex, b) Number of Years of Teaching Experience, c) Major Teaching Subject, d) Computer Training, e) Possession of computer, f) Number of Teachers in the subject's school possessing microcomputers, g) Experience in using computers and the type of microcomputer that the subject was most familiar with.

These were frequency data. A list of answers for each item was provided for the subjects to circle, with the exception of e) and g) which were open-ended.

Instrument to measure Teachers' Difficulties in Introducing Computers for Educational Purpose

This instrument was constructed to measure the teachers' difficulties in teaching their subjects with computers. In order to identify the difficulties most teachers would face, twenty teachers in the researcher's school were asked to name ten difficulties. Besides, about forty teachers attending a computer course organised by the microcomputer club of the Hong Kong Professional Teachers' Union (PTU) were also asked

to do the same thing. Six most frequently mentioned difficulties were selected to form items in the instrument. The items were written in 5-scale Likert types:

1. Very Difficult(VD)
2. Difficult(D)
3. Undecided(U)
4. Easy(E)
5. Very Easy(VE)

The difficulty level (DIF) was determined by taking the mean value of the scores of the six items. The higher the mean, the more difficult the subject would feel when they were asked to teach with a computer.

Teachers' Intent to use Computers for Educational Purpose

Based on the scale developed by Rohner and Simonson (1981), this instrument was constructed to measure the teachers' intent to use computers for educational use. It consisted of fourteen items. The subjects were asked to circle one of the following five answers of the Likert scale:

1. Strongly Agree(SA)
2. Agree(A)
3. Undecided(U)
4. Disagree(D)
5. Strongly Disagree(SD)

The scores of these fourteen items were combined to form

a mean value for a single measure (INT), which gives an indication of the subject's intent to use computers for educational purpose. High mean value indicates a favourable intent.

Teachers' Attitudes towards In-service Programs on Computers

Based on the scale developed by Trueblood (1981), this instrument was constructed to measure the teachers' attitudes towards in-service programs on computers for educational use. It consisted of ten items. The subjects were asked to circle one of the five Likert scales as in the previous instrument. These ten items were then combined to form a mean value for a single measure (ATT). High mean value indicates that the subject has positive attitude towards in-service programs on computers for educational purpose.

Pilot Study of the Instruments

The questionnaire was developed and tested with 142 teachers and principals who participated in the Career Masters' Seminar '83 organised by Hong Kong Association of Careers Masters.

The Reliability of the instruments

The reliability coefficients (Cronbach alpha) for each instrument in the pilot study are presented in Table 1 below.

Table 1

Reliability Coefficients of the Instruments in the Pilot Study

Scale	No. of Items	Alpha	Std. Item Alpha
DIF	6	.714	.715
INT	14	.743	.750
ATT	10	.641	.676

Procedure

After the pilot study, the instruments were discussed among four teachers who had experience in writing questionnaires. They were revised to fit the present study. The questionnaires, together with two covering letters: one in English and the other in Chinese, were sent to the principals who kindly consented to help in the study. The questionnaires were collected two weeks later.

Variables

Dependent Variables. There are three dependent variables in this study:

DIF - Teachers' Difficulties in Introducing Computers for Educational Purpose

INT - Teachers' Intent to use Computers for Educational Purpose

ATT - Teachers' Attitudes towards In-service Programs on Computers for Educational Purpose

Independent Variables. There are five independent variables in this study:

SEX - Sex of the subjects

TEX - Number of years of teaching experience of the subjects

SUB - Major teaching disciplines of the subjects

TRA - Computer training or courses taken by the subjects

USE - Subjects' experience to use computers

Data Analysis

The data obtained from the questionnaires were entered into the IBM - 3031 Computer. All statistical analyses were done by the SPSS package. Programs for the statistical analyses are presented in Appendix C.

To perform descriptive statistics. Descriptive statistics were employed to find the frequencies of the answers in each item of personal data marked by the subjects.

To check the Reliability of the instruments. Since DIF, INT and ATT were composed of many items, Cronbach alpha and the standardized item alpha were computed to check the reliability of the instruments.

To test the Hypotheses 1, 2 and 3. three-way ANOVA was employed to test these hypotheses. The criterion variables were DIF, INT and ATT. The independent variables were SEX, TEX and SUB.

CHAPTER III: RESULTS AND DISCUSSIONS

Descriptive Statistics

From teachers' personal data, the following frequency tables were constructed:

Teachers' computer training:

Table 2

Teachers' Computer Training

Number of Teachers	Absolute Frequency	Relative Freq(PCT)	Adjusted Freq(PCT)
With Training	122	28.9	29.8
Without Training	288	68.2	70.2
Missing	12	2.8	

From Table 2, it could be seen that only about 30% of teachers had some kind of computer training. The majority were not trained. It could be inferred that in-service programs on computers for the teachers are necessary.

Possession of computer:

Table 3

Teachers' Possession of Computers

Number of Teachers	Absolute Frequency	Relative Freq(PCT)	Adjusted Freq(PCT)
With Computer	61	14.5	15.3
Without Computer	338	80.1	84.7
Missing	23	5.5	

Table 4

Popular Brands of Microcomputers possessed by Teachers

Brand	Absolute Frequency	Relative Freq(PCT)	Adjusted Freq(PCT)
Apple II	38	9.0	75.5
NEC	4	0.9	7.8
ATARI	2	0.5	3.9
TRS 80	2	0.5	3.9
Commodore	2	0.5	3.9
Others	3	0.6	5.8
Missing	371	87.9	

Only 14.5% of the teachers possessed microcomputers. The most popular microcomputer was Apple II. There were two reasons, as suggested by the Apple user, for the popularity: One was the low costs of CPU and peripherals; the other was the availability of a wide range of software -- from games to utility programs. In Table 4, missing responses were interpreted as not possessing any computer.

Teachers' experience to use computers

Table 5

Number of Teachers who used Computers

Number of Teachers	Absolute Frequency	Relative Freq(PCT)	Adjusted Freq(PCT)
Used computers	162	38.4	41.4
Never used	229	54.3	58.6
Missing	31	7.3	

Table 6

Most popularly used Computers

Brand	Absolute Frequency	Relative Freq(PCT)	Adjusted Freq(PCT)
Apple II	81	19.2	68.6
NEC	9	2.1	7.6
ATARI	5	1.2	4.2
TRS 80	5	1.2	4.2
Others	18	4.3	15.3
Missing	304	72.0	

About 40% of the teachers had used computers before. The microcomputer which 19% of the subjects were familiar with was Apple II.

Reliability of the Instruments

Teachers' Difficulties (DIF) in Introducing Computers for Educational Purpose

Table 7

Reliability Coefficients of DIF

No.	Mean	STD	Corrected item-total correlatn.	Alpha if item deleted
1.	3.604	1.218	.7328	.8565
2.	3.716	1.176	.7905	.8475
3.	3.867	1.184	.7344	.8565
4.	3.595	1.184	.7562	.8530
5.	3.322	1.293	.6645	.8682
6.	4.220	1.303	.5128	.8936
Alpha=.883		Std Item Alpha=.886		

From the results of Table 7, it could be seen that the item-total correlation, except for Item 6, was rather high. The Cronbach alpha for DIF (6 items) was .883 and the standard item alpha was .886, which means that the internal consistancy of DIF was reliable. From the mean values of each item, it could be deduced that the most difficult thing for teachers to teach with compouters was to acquire appropriate textbook and resource materials (Item 6), followed by Item 3, which indicates the difficulty of writing teaching programs with proficiency. The least difficulty they claimed was to keep the class in discipline when students ware at the terminals (Item 5).

Tachers' Intent (INT) to use Computers for Educational Purpose

From Table 8, it could be seen that the item-total correlation, except for Item 6, was above .34. The Cronbach alpha was .788 and the standard item alpha was .786, which means that the internal consistency of INT was also high.

Teachers' Attitudes (ATT) towards In-service Programs on Computers for Educational Purpose

It could be seen in Table 9 that there were two items (Item 5 and Item 9) that showed low item-total correlations. However, the Cronbach alpha was found to be .723 and the standard item alpha was .724, which means that the internal consistancy of ATT was acdeptable.

Test of Hypotheses 1, 2 and 3

The associations of DIF, INT and ATT with SEX, Teaching Experience (TEX) and Major teaching discipline (SUB) were tested by the analysis of variance. Three-way ANOVA was employed to calculate the F ratios and the Multiple Classification Analysis was employed to detect the categories with significant deviation from the grand mean. Graphs of the cell means were constructed.

Table 8

Reliability Coefficients of INT

No.	Mean	STD	Corrected item-total Correlatn.	Alpha if item deleted
1.	3.409	.911	.5264	.7647
2.	3.311	1.048	.4868	.7676
3.	3.546	.923	.3422	.7808
4.	3.050	1.036	.3652	.7796
5.	2.844	.934	.4627	.7702
6.	2.858	.935	.2675	.7873
7.	3.541	.823	.3526	.7796
8.	2.433	.972	.3547	.7800
9.	3.359	.893	.3519	.7798
10.	3.836	.734	.3462	.7801
11.	3.272	.886	.4792	.7691
12.	3.332	.855	.5016	.7675
13.	3.127	.948	.6477	.7528
14.	2.900	.739	.1636	.7924

Alpha=.788 Standard Item Alpha=.786

Table 9

Reliability Coefficients of ATT

No.	Mean	STD	Corrected item-total Correlatn.	Alpha if item deleted
1.	3.726	.789	.5163	.6800
2.	2.897	.904	.3030	.7150
3.	3.487	.808	.6625	.6547
4.	3.698	.889	.5484	.6714
5.	3.834	.832	.1732	.7335
6.	3.405	.831	.5696	.6696
7.	3.427	.802	.2503	.7211
8.	3.422	.773	.4556	.6900
9.	2.925	.818	.1472	.7368
10.	2.950	.823	.2510	.7214

Alpha=.723 Standard Item Alpha=.724

Teachers' Difficulties (DIF) in Introducing Computers for Educational Purpose

From the results in Tables 10, it was seen that there was significant difference in the mean scores of the difficulty among teachers of different number of years of teaching experience and teaching subjects. Since the interaction of TEX and SUB was significant, graphical representation of

interaction was employed. From Figure 1 and Table 11, teachers teaching fine arts subjects with 11-20 years of teaching experience and those teaching arts subject with over 20 years of teaching experience found it least difficult to teach their subjects with computers.

Table 10

Three-way ANOVA of DIF by SEX TEX SUB

Source of Variation	Sum of Squares	D.F.	Mean Square	F	Signif of F
Main Effects	25.044	7	3.578	2.890	* *
SEX	0.792	1	.0792	0.639	
TEX	13.100	4	3.275	2.645	*
SUB	8.713	2	4.357	3.519	*
2-W Interact.	37.793	14	2.700	2.180	* *
SEX TEX	6.527	4	1.632	1.318	
SEX SUB	4.954	2	2.47	2.01	
TEX SUB	23.251	8	2.906	2.347	*
3-W Interact.	6.807	7	0.972	0.785	
Residual	475.425	384	1.238		
Total	545.069	412	1.323		

Figure 1.

Graphical Representation

of Interaction of DIF

by TEX SUB

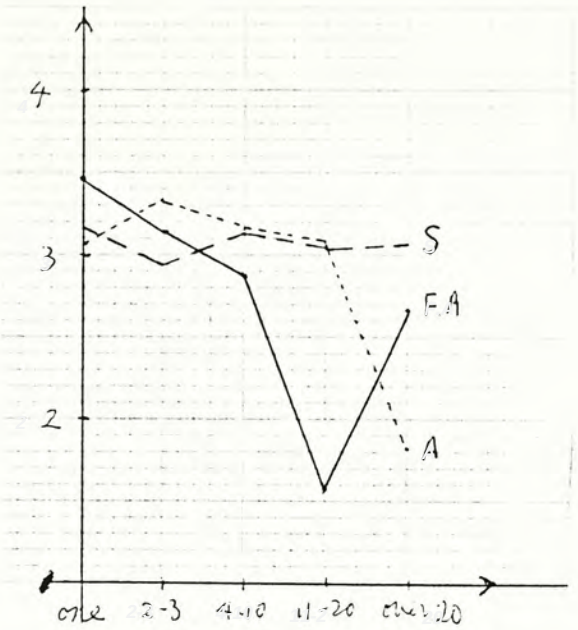

Table 11

Multiple Classification Analysis

Variable + Category		N	Unadjusted Dev'n	Eta	Adjusted For Independents Dev'n	Beta
SEX	1	200	-0.07		-0.05	
	2	213	0.06		0.05	
				0.06		0.04
TEX	1	40	0.10		0.06	
	2	63	0.17		0.14	
	3	185	0.09		0.10	
	4	98	-0.14		-0.15	
	5	27	-0.61		-0.55	
				0.17		0.16
SUB	1	59	-0.38		-.036	
	2	112	0.04		0.08	
	3	242	0.07		0.05	
				0.14		0.13

Teachers' Intent to Use Computers

Table 12

Three-way ANOVA of INT by SEX TEX SUB

Source of Variation	Sum of Squares	D.F.	Mean Square	F	Signif of F
Main Effects	20.696	7	2.957	6.021	* *
SEX	5.301	1	5.301	10.795	* *
TEX	12.470	4	3.118	6.349	* *
SUB	2.424	2	1.212	2.468	
2-W Interact.	21.237	14	1.517	3.089	* *
SEX TEX	12.310	4	3.077	6.267	* *
SEX SUB	1.124	2	0.562	1.145	
TEX SUB	6.564	8	0.821	1.671	
3-W Interact.	2.510	7	0.359	0.730	
Residual	188.568	384	0.491		
Total	233.010	412	0.566		

From the results in Table 12, it was seen that there was significant difference in the mean scores of the intent to use computers among teachers of different sexes, and different number of years of teaching experience. Since the interaction of SEX and TEX was significant, graphical representation of interaction was employed. From Figure 2 and Table 13, it was found that female teachers with over 20 years of teaching experience had lowest intent to use computers.

Figure 2.

Graphical Representation of Interaction of INT by SEX TEX

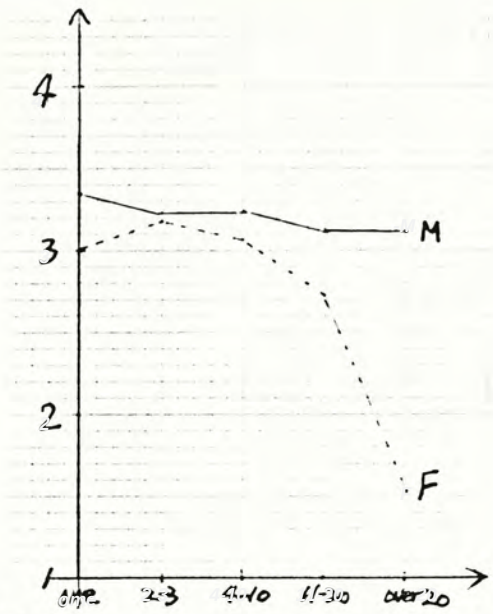

Table 13

Multiple Classification Analysis

Variable + Category		N	Unadjusted Dev'n	Eta	Adjusted For Independents Dev'n	Beta
SEX	1	200	0.12		0.12	
	2	213	-0.11		-0.12	
				0.16		0.16
TEX	1	40	0.34		0.09	
	2	63	0.13		0.15	
	3	185	0.08		0.09	
	4	98	-0.12		-0.15	
	5	27	-0.49		-0.53	
				0.21		0.23
SUB	1	59	-0.14		-0.11	
	2	112	0.17		0.12	
	3	242	-0.04		-0.03	
				0.14		0.11

Teachers' Attitudes (ATT) towards In-service Programs on Computers for Educational Purpose

Table 15

Three-way ANOVA of ATT by SEX TEX SUB

Source of Variation	Sum of Squares	D.F.	Mean Square	F	Signif of F
Main Effects	23.517	7	3.360	5.957	* *
SEX	6.422	1	6.422	11.387	* *
TEX	19.332	4	4.833	8.569	* *
SUB	0.006	2	0.003	0.005	
2-W Interact.	21.266	14	1.519	2.693	* *
SEX TEX	13.530	4	3.383	5.998	* *
SEX SUB	1.108	2	0.554	0.982	
TEX SUB	4.845	8	0.606	1.074	
3-W Interact.	2.481	7	0.354	0.628	
Residual	216.572	384	0.564		
Total	263.836	412	0.640		

From the results in tables 15, it was seen that there was significant difference in the mean scores of the attitudes towards in-service programs on computers for educational purpose among teachers of different sex, and different number of years of teaching experience. Since the interaction of SEX and TEX was significant, graphical representation of interaction was employed. From Figure 3 and Table 16, it can be seen that female teachers with over 20 years of teaching

experience had lowest attitudes towards in-service programs on compuers.

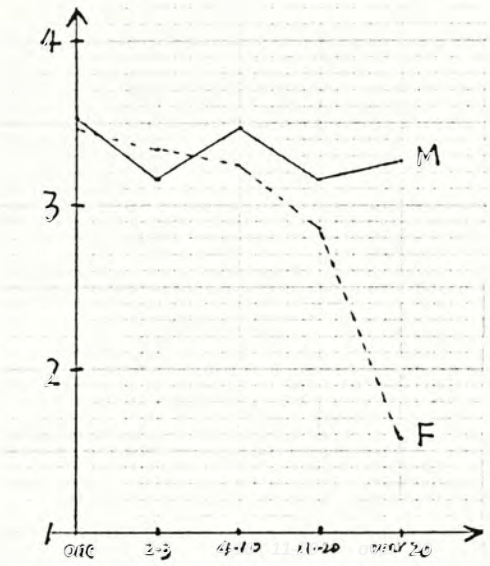

Figure 3.

Graphical Representation of Interaction of ATT by SEX TEX

Table 16

Multiple Classification Analysis of ATT

Variable + Category		N	Unadjusted Dev'n	Eta	Adjusted For Independents Dev'n	Beta
SEX	1	200	0.10		0.14	
	2	213	-0.10		-0.13	
				0.12		0.17
TEX	1	40	0.25		0.29	
	2	63	0.03		0.05	
	3	185	0.12		0.12	
	4	98	-0.20		-0.22	
	5	27	-0.53		-0.57	
				0.25		0.27
SUB	1	59	-0.03		-0.00	
	2	112	0.03		-0.01	
	3	242	-0.01		0.00	
				0.03		0.00

A POSTERIORI TESTS

In order to probe further into the matter, a posteriori tests were performed. The following results were obtained.

Table 17

Two-way ANOVA of DIF by TRA USE

Source of Variation	Sum of Squares	D.F.	Mean Square	F	Signif of F
Main Effects	4.341	2	2.171	1.848	
TRA	4.276	1	4.276	3.640	
USE	0.594	1	0.594	0.506	
2-W Interact.	6.063	1	6.063	5.162	*
Residual	446.339	380	1.175		
Total	456.743	383	1.193		

Table 18

Table of Cell Means of DIF by TRA USE

	USE	Yes	No
TRA	No	3.09(36)	3.00(199)
	Yes	3.11(90)	3.66(27)

From the results of Table 17, it could be seen that there was no significant difference in the mean scores of the difficulty among teachers with and without computer training, and those with and without experience in using computers. There was significant interaction between TRA and USE. From Table 18, cell means showed that teachers who received some

kind of computer training yet did not have any chance to use computers would find it most difficult to teach with computers while those who had never used computers before and had not received any computer training would find it least difficult. This might reflect that the difficulties would appear when one has some incomplete knowledge of computers. As one has some hand-on experience, some of the difficulties would be lessened.

Table 19

Two-way ANOVA of INT by TRA USE

Source of Variation	Sum of Squares	D.F.	Mean Square	F	Signif of F
Main Effects	10.130	2	5.065	10.560	* *
TRA	2.735	1	2.735	5.701	*
USE	2.522	1	2.522	5.257	*
2-W Interact.	0.020	1	0.020	0.041	
Residual	182.262	380	0.480		
Total	192.412	383	0.502		

Table 20

Table of Cell Means of INT by TRA USE

	USE	Yes	No
TRA	No	3.16(68)	2.96(199)
	Yes	3.35(90)	3.19(27)

From the results of Table 19, it was seen that there was significant difference in the mean scores of the intent to

use computers for educational purpose among teachers with and without computer training, and those with and without experience in using computers. Inspection of the table of cell means showed that teachers who received some kind of computer training and had used computers would have high intent to use computers while those who had never used computers before and had not received any computer training would have lowest intent.

Table 21

Two-way ANOVA of ATT by TRA USE

Source of Variation	Sum of Squares	D.F.	Mean Square	F	Signif of F
Main Effects	4.528	2	2.264	4.066	*
TRA	0.361	1	0.361	0.649	
USE	2.251	1	2.251	4.041	*
2-W Interact.	0.533	1	0.533	0.957	
Residual	211.625	380	0.557		
Total	216.687	383	0.566		

Table 22

Table of Cell Means of ATT by TRA USE

	USE	Yes	No
TRA	No	3.39(68)	3.15(199)
	Yes	3.39(90)	3.35(27)

From the results of Table 21, it was seen that there was significant difference in the mean scores of the attitudes

towards in-service programs on computers between teachers with and without experience in using computers. Inspection of the table of cell means showed that teachers who had used computers before had more positive attitudes towards in-service programs on computers while those who had never used computers before and had not received any computer training would have the lowest attitudes.

Finally, it was found that teachers who had high intent to use computers also had more positive attitudes towards in-service programs on computers ($r=.707$, p .001). Even those teachers who felt it difficult to teach with computers showed intent to use them ($r=.3556$, $p<.001$) and had positive attitudes ($r=.3337$, $p<.001$) towards in-service programs.

Limitations

In the interpretation of results of the present study the following limitations should be taken into consideration:

1. Since most of the arts and fine arts teachers had not received any computer training or did not have any experience in using computers, their views might not reflect the actual situation. The result that arts teachers of more than 20 years of teaching experience found it least difficult to teach with computers was an example. If they were exposed to computers so that they knew how computers could be used in teaching their subjects, the difficulties listed in the instrument might be resolved or lessened, but other difficulties which had not been perceived in this study might appear.
2. The sample in this study consisted of teachers of schools where principals and teaching staff had some knowledge in computers. The attitudes of these teachers might be influenced by their principal and colleagues. There might be some schools where no teachers were interested in computer applications. Their attitudes might be different from what were obtained in this study.
3. Though the return rate was quite high in this study, there were teachers who did not return their questionnaires. The attitudes of this group of teachers were not clear. These teachers usually had negative attitudes, but there might be a possibility that some teachers who, for some

unknown reasons, did not return their questionnaires, might had positive attitudes.

4. The number of teachers in different categories of teaching experience and different teaching subjects were not equal. This factor is beyond the control of the researcher.

CHAPTER IV: SUMMARY AND RECOMMENDATIONS

Summary

This study was intended to find out how sex, number of years of teaching experience and major teaching subjects affect teachers' participation in computer training, their use in computers, the difficulties they would face if they were asked to teach with computers, their intent to use computers for educational purposes and their attitudes towards in-service programs on computers.

The method was a survey research. A questionnaire consisting of four instruments -- Personal Data, Teachers' difficulties to teach with computers (DIF), Teachers' intent to use computers for educational purpose (INT) and Teachers' attitudes towards in-service programs on computers (ATT) -- was developed by the researcher. Fourteen schools, which included boys', girls' and co-educational school, were invited to participate in the study. 581 questionnaires were sent to teachers of the whole school; 422 were returned. The sample consisted of 201 males and 221 females. They were grouped into five categories according to their teaching experience -- one, 2-3, 4-10, 11-20, over 20 years of teaching experience and three groups of teaching subjects -- Fine Arts, Science, Arts.

The subjects' computer training was divided into two categories -- with computer training and without computer

training.

The subjects' experience in using computers was also divided into two groups -- with experience and without experience in using computers. The teachers were also asked to write down the brands and models of the computers that they are most familiar with.

In the instrument to measure teachers' difficulties (DIF) in introducing computers for educational purpose, the responses were grouped into five categories. They were: Very Difficult (VD), Difficult (D), Undecided (U), Esay (E), and Very Easy (VE). There were six items. The total score of the scale was reckoned as the subject's score in this aspect.

In the instruments to measure teachers' intent (INT) to use computers and attitudes (ATT) towards in-service programs on computers. the responses were also divided into five groups. They were: Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Stronglv Disagree (SD). There were fourteen items in INT and ten items in ATT. The total scores of the corresponding scales were reckoned as the subjects' scores in INT and ATT respectivelv.

The following results were obtained in this study:

1. Only 28.9% of the teachers in this study got some sort of computer training. There was no significant difference in computer training among teachers of different major teaching

subjects.

2. The most popular brand of microcomputer was Apple II (38 sets). The next one was NEC (4 sets). ATARI, TRS 80 and Commodore shared the third position (2 sets each).

3. 162 teachers (38.4%) had the experience in using computers. Among them: 56.8% were males: 49.4% had 4-10 years of teaching experience. Of the teachers who had not used computers before, 64.6% were females; 84.0% had more than 20 years of teaching experience and 66.1% were arts teachers.

4. The reliability coefficients of the instruments were:

a) DIF -- Alpha=.883 Std Item Alpha=.886

b) INT -- Alpha=.788, Std Item Alpha=.786

c) ATT -- Alpha=.723, Std Item Alpha=.724

Judging from these coefficients, these instruments were fairly reliable.

5. The majority of the teachers found it difficult to teach with computers. Teachers with 11-20 years of teaching experience in fine arts subjects, and those with more than 20 years of teaching experience in arts subjects found it least difficult.

6. The majority of the teachers had high intent to use computers for educational purposes. Female teachers with more than 20 years of teaching experience had the lowest intent.

7. The majority of the teachers had positive attitudes

towards in-service programs on computers for educational purposes. Female teachers with more than 20 years of teaching experience had the lowest attitudes scores.

8. Teachers who attended some kind of computer training but did not have any chance to use computers would find it most difficult to teach with computers while those who had never used computers and never attended any computer training before would find it least difficult.

9. Teachers who had received computer training and used computers had the highest intent to use computers while those who had never received any computer training and never used any computers before had the lowest intent.

10. Teachers who had used computers before showed more positive attitudes towards in-service programs on computers, while those who had not received any computer training and never used computers before showed the lowest score.

11. Teachers who had high intent to use computers also showed more positive attitudes towards in-service programs on computers. Even those teachers who felt it difficult to teach with computers showed some intent to use computers and had positive attitudes towards in-service programs.

Recommendations

There are several recommendations for the promotion of computers in secondary schools for educational purposes.

1) Since most teachers' attitudes towards in-service programs on computers are positive, the universities, the polytechnic and the colleges of education should conduct more in-service courses on computers for teachers, especially for arts and fine arts teachers. These in-service programs should not be on the theory part of computers. Teachers should be taught the applications of computers in the classroom. For example, for arts teachers, the course is on how to operate a computer; how to load and run computer-graphics, and how to control the colours. For English teachers, it is on how to operate a computer; how to use the drilling exercises on verbs; and how to use computers for remedial work. Someone may argue that computers are so complicated that they are beyond the ability of an ordinary teacher to learn. In fact the teachers need not go into the details of the theory part of computers. What they need to know is the process to operate them. Besides, microcomputers are easy to handle. A child ten years old could control a microcomputer with some confidence. If teachers could overcome their fear and anxiety on computers, they would learn how to use computers easily.

2) In the First Annual Conference of the Hong Kong Association for Science and Mathematics Education on School-Based INSET, it was pointed out by a principal that teachers who know how to use computers can conduct something like seminars within their schools to teach their colleagues. Then

teachers are broken down into small groups of several people to try out the programs on the computers themselves. These experience-sharing seminars have proved to be very efficient. For those schools without computers, similar INSET programs across schools can be conducted by associations such as HKACE, HKASME and the Microcomputer Club of PTU.

3) It was found that teachers' experience in using computers is a significant factor in their intent to use computers, it is therefore recommended that more computers are provided to the schools so that teachers can learn and use them.

4) Since teachers found it most difficult to acquire resource materials for teaching, computer manufacturers should produce more high quality softwares which include teaching notes, simulations and drilling exercises. One way of increasing popularity is to reduce the price. The popularity of Apple II is an example. The other is to send trial programs to subject panels of schools so that teachers of that subject can try them on their computers. Specimen or inspection copies are examples of this approach which have long been used in the promotion of textbooks.

Implications for Further Study

1) Even though INT is closely related with computer anxiety (Rohner & Simonson, 1981), teachers' anxiety has not been

measured. It is necessary to look more closely into the teachers' anxieties in order to promote the use of computers in schools. Future research in this direction should be carried out.

2) Teachers' attitudes towards computers before and after the introduction of computers should be measured. How teachers' attitudes are affected by the introduction of computers may be important in the development of computer education.

3) Students' attitudes towards computers before and after the introduction of computer studies should be investigated. This is a longitudinal study. The attitudes of students, at the end of Form 3, 4 and 5, should be measured by using the same instrument or equivalent ones. This kind of studies will show how students' attitudes change when exposed to computers. This can be an effective evaluation of the Computer Studies Course.

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香港電腦教育學會
The Hong Kong Association for Computer Education
c/o St. Paul's Secondary School,
Ventris Road, Happy Valley
Hong Kong

校長先生：

隨着電腦科的設立，愈來愈多的學校裝置了微型電腦．微型電腦的性能也有了很大的進步．它不單只可以顯示文字，還可以顯示彩色圖象，甚至中國文字．在外國，由於語言關係，電腦輔助教學已經很普遍．在香港，電腦只是在四節電腦課時及放學後才使用，很多對它有認識的老師都希望把它應用在自己的科目上，作爲一種新穎的教具．一些對它沒有認識的老師便感到很困惑．爲了瞭解各科老師們對使用電腦作教學用途的意願，所遇到的困難及對在職電腦訓練的態度，作爲日後策劃活動的參考及對有關當局作出改進建議的依據，本人特設計了一份問卷，請各科老師圈填．有勞
校長先生代爲派發給貴校各位老師．並請代爲收集，本人將於五月底親到貴校收取．勞神之處，容後面謝．

梁健平謹啓
香港電腦教育學會硬件主任
一九八三年五月拾七日

香港電腦教育學會
The Hong Kong Association for Computer Education
c/o St. Paul's Secondary School,
Ventris Road, Happy Valley
Hong Kong

20th May, 1983.

Dear Principal,

With the introduction of the Computer Studies Pilot Scheme, more and more microcomputers will be installed in Hong Kong secondary schools. Schools not offering this subject may install one or two sets for their computer club or for administration purposes. There are great improvements in the abilities of microcomputers: they are not limited to character display and number crunching, but can display colour graphics, or even Chinese characters. Some teachers may try to use them in their teaching, others may regard them as a threat to their profession. In order to organise activities which are useful to teachers, we need to know their opinions. I have thus designed a questionnaire attempting to gain some information from classroom teachers concerning their intent to use computers for educational use, their attitudes towards inservice programs on computers and the difficulties they might face if they were asked to teach with computers.

I should be most grateful if you could distribute the enclosed questionaires to your teachers and collect them later for me. I will come to collect them at the end of May or early June. I would like to thank you for your great help despite a tight school schedule.

Yours sincerely

Leung Kin Ping
Hardware Convener
H.K.A.C.E.

50

Serial no.:_____(for computer use only)
編號: 供輸入電腦時使用

CONFIDENTIAL

敬啟者:

Dear Sir/Madam,

With the introduction of Computer Studies, more and more computers will be installed in Hong Kong secondary schools. They are used only outside school hours. Some teachers try to make use of them in their teaching, but some regard them as a threat to their profession. What is your opinion? Since computer is a relatively new device that only some teachers have the chance to learn, their applications in education may cause us lots of trouble. This questionnaire is an attempt to gain information from classroom teachers concerning their intent to use computers for educational use, their attitudes towards inservice programs on computers and the difficulties they face when they are asked to teach with computers.

隨着電腦科的開設,愈來愈多中學添置了微型電腦.它們只是下課時間才使用.有些老師想把它們應用於教學上.但另一些老師卻認爲它們對教學專業是一種威脅.您的意見認爲如何?因爲電腦是一種新穎的教具,只有一部份老師有機會學習使用.若把它們普遍地應用在教學上,可能會帶來很多問題.本問卷希望知道老師們對使用電腦作教學用途的意願,對在職電腦訓練的態度及使用電腦教學時所遇到的困難.

Please fill in this questionnaire. All replies will be kept confidential. No names of school or teachers will be identified in the study. If you have any ideas, please feel free to write them down. Your help will be very much appreciated.

請填答此問卷.所有資料會絕對保密,不會透露有關學校及老師的姓名.如有什麼意見,請隨意書寫下來.多謝您的協助.

SECTION I 甲部

Personal Data 個人資料

Please circle the appropriate number in every item
請在下列各項中,圈取適當的號碼

1. Sex Male (1), Female (2)
性別 男 女

2. Years of teaching experience (including this year)
教學年資(包括今年在內)

	(1)	(2)	(3)	(4)	(5)
	one	2-3	4-10	10-20	over 20
	一年	二至三年	四至十年	十至廿年	廿年以上

3. Major teaching subject:
主要教授科目

Art(1), Biology(2), B.K.(3), Chemistry(4), Chinese(5), Chi. History(6),
美術 生物 聖經 化學 中文 中國歷史
Economics/BP&A(7), English(8), Geography(9), History(10), Maths.(11),
經濟/經公 英文 地理 歷史 數學
Music(12), Physics(13), P.T.(14)
音樂 物理 體育

4. Previous training or courses taken in computer science:
以往曾選修之電腦課程及訓練:
I have not taken any such course(1)
我沒有修讀過任何此類課程
Computer courses in post secondary schools:
在大學或專上學院選修之電腦課程:
HKU(2), CUHK(3), Polytech(4), College of Education(5), Overseas(6)
港大 中大 理工 教育學院 海外
Extramural course by:
由下列機構主辦之校外課程:
HKU(7), CUHK(8), Polytech(9), Overseas(10)
港大 中大 理工 海外
Special course for teachers by:
為教師而設之特別課程:
HKU(11), CUHK(12), Polytech(13), ED & CU(14), College of Educatiuon(15),
港大 中大 理工 教署與中大合辦 教育學院
Overseas(16)
海外
Other training:
其他訓練:
HKACE(17), P.T.U.(18), Private institution(19), Self taught (20)
香港電腦教育學会 教協電腦组 私立電腦商科學校 自學
5. Do you own a microcomputer? Yes (1) No (2) If yes, give details
你是否擁有電腦? 是 否 若是,請填以下兩項
Brand_____Model_____
牌子 型號
6. How many of your colleagues own microcomputers?
貴校同事中共有多少人擁有電腦?
1 (1), 2 (2), 3 (3), 4 (4), 5 (5), more than 5 (6)
一人 兩人 三人 四人 五人 五人以上
7. Do you have any chance to use computers? Yes(1), No(2)
你有否使用過電腦? 有 沒有
If yes, Please state the brand and model of the computer you are most familiar with:
若有,請寫出你最熟悉的電腦牌子及型號
Brand_____Model_____
牌子 型號

SECTION II Difficulties in introducing computers for educational use
乙 部 使用電腦作教育用途所引起之困難

Please indicate how difficult you feel on the following points when you are asked to use computers to teach your subject. Please circle the appropriate number.

請圈出適當的數字以表示您對使用電腦教授您的科目時所感覺的困難程度

Key: 提示.

Very Difficult (VD) -- 1, Difficult (D) -- 2, Undecided (U) -- 3,
非常困難 困難 無意見
Easy (E) -- 4, Very Easy (VE) -- 5.
容易 非常容易

極難 難 易 極易
VD D U E VE
1 2 3 4 5

1. To operate the computers with confidence.
充滿信心地使用電腦

2. To realise the objectives and aims of the lesson using computers.
用電腦去達成該教節的目的及目標.

3. To write teaching programs with proficiency.
熟練地編寫教學程序

4. To avoid clashes in the use of computers when teachers of bother subjects use Computer Assisted Instruction in their teaching.
避免因其他老師都使用電腦輔助教學而引致在使用電腦時有所衝突

5. To keep the class in discipline when students are at the terminals.
在學生使用電腦時保持課室秩序

6. To acquire appropriate textbooks and resource materials.
採用合適的課本及有關資料

SECTION III Teachers' opinion
兩部 老師的意見

A. The following statements are designed to measure teachers' intent to use computers for educational use. There are no right or wrong answers. Read each statement and decide how you feel about it. Then circle the number that best represent your opinion.

下列句語爲探求老師對使用電腦作教育用途之意願而設,並無所謂正確或錯誤之答案. 請細讀每一句語,並表示意見. 請圈取最切合的號碼.

Key: 提示.

Strongly Agree (SA) -- 1, Agree (A) -- 2, Undecided (U) -- 3,
非常同意 同意 無意見
Disagree (D) -- 4, Strongly Disagree (SD) -- 5.
不同意 非常不同意

非常同意 同意 無意見 不同意 非常不同意
SA A U D SD
1 2 3 4 5

1. Having a microcomputer in the classroom would improve my teaching.
在課室中裝設微型電腦会對我的教學有幫助

2. My subject area is not appropriate for using the micro-computer.
我所任教的科目範圍內不適宜使用電腦

3. I believe that more money should be spent on computer equipment in schools.
我認爲應該將更多金錢使用在學校的電腦設備上

4. Any teacher should know how to use microcomputers in the classroom. 1 2 3 4 5
任何老師都應懂得在課室中應用微型電腦

5. Given the choice between teaching a subject through a traditional method or on a computer program, I would probably choose the traditional method. 1 2 3 4 5
在使用傳統教學方法和使用電腦程序兩種選擇中,我會選擇傳統方法

6. I believe microcomputers are too complicated for the average teacher to run. 1 2 3 4 5
我相信對一般教師來說,微型電腦的操作可能会是太複雜了

7. microcomputer in schools contributes to a sound education. 1 2 3 4 5
學校使用電腦可以促進完善教育

8. My use of computers has been very limited. 1 2 3 4 5
我對電腦應用的需求非常有限

9. Microcomputers distract from the quality of instruction. 1 2 3 4 5
使用微型電腦会令人忽視教學質素

10. Teacher should be willing to try using a microcomputer. 1 2 3 4 5
老師應嘗試使用微型電腦

11. Microcomputers can be used for instruction in many subject areas. 1 2 3 4 5
微型電腦可以應用到各科的教學上

12. I look forward to the time when there are microcomputers in all classrooms. 1 2 3 4 5
我祈望所有課室都裝有微型電腦

13. I am not prepared to make use of the microcomputer in my teaching. 1 2 3 4 5
我不打算使用電腦来教學

14. Few schools have successfully used microcomputers in teaching. 1 2 3 4 5
很少學校能夠成功地使用電腦来教學

B. Teachers' opinions on Inservice Programs on Computers.
老師對在職電腦訓練的意見

	非常同意 SA	同意 A	無意見 U	不同意 D	非常不同意 SD
1. Inservice programs on computers can help teachers to improve the organization and content of their school curriculum. 在職電腦訓練可以幫助教師們改良他們學校課程的組織及內容		1	2	3	4 5
2. I feel inservice programs on computers provide me with the opportunity to gain recognition and additional responsibility. 我覺得在職電腦訓練為我提供被重視及升遷機会.		1	2	3	4 5
3. I feel inservice programs on computershelp me improve my teaching. 我覺得在職電腦訓練可以幫助我改善我的教學工作		1	2	3	4 5
4. I look forward to participating in inservice programs on computers. 我希望能參加在職電腦訓練		1	2	3	4 5
5. I can understand better if the inservice program is taught by a learned and enthusiatic teacher than an engineer. 我認為由一個熱心而又對電腦有深切認識的教師向教師灌輸電腦知識会比一個電腦工程師更為優勝		1	2	3	4 5
6. I believe inservice programs on computers can be used to prove the teaching of my subject in my school. 我相信在職電腦訓練可以用來改善本校本科的教學工作		1	2	3	4 5
7. I believe one probably cannot change a teacher's attitudes towards computers through inservice programs. 我認為教師對電腦的態度是不能通過在職訓練來改變		1	2	3	4 5
8. Inservice programs on computers help me achieve some of my professional goals. 在職電腦訓練可以幫助我達成我的一部份專業目標		1	2	3	4 5
9. I believe most university professors know what teachers' inservice needs are and how to help them improve their teaching by means of computers. 我相信大部份大學教授都知道教師的在職訓練需要是什麼和怎樣去幫助他們利用電腦改良教學工作		1	2	3	4 5
10. I think properly conducted inservice programs on computers can help teachers improve the discipline in their schools. 我認為對在職教師學習電腦之適當學訓可以幫助他們改進學校的紀律		1	2	3	4 5

問卷完. 多謝! THE END. THANK YOU

Appendix D

Computer Programs

Descriptive Statistics

```
//CEPU4140 JOB (CU808140),'K.P.LEUNG',TIME=(,15),MSGCLASS=A,CLASS=A
// EXEC CHECKID,PARM.PASSWORD=XXXXXX
// EXEC SPSS,PRINT=A
//SYSIN DD *
//
RUN NAME          FREQUENCIES
FILE NAME         SURVEY
VARIABLE LIST     SCH,SEX,TEX,SUB,TRA,OWN,BRA1,COL,USE,BRA2,D1 TO D6,
                  I1 TO I14,A1 TO A10
INPUT FORMAT      FIXED(10F2.0,30F1.0)
N OF CASES        422
INPUT MEDIUM      CARD
MISSING VALUES    ALL(0)
RECODE            SUB(1,3,12,14=1)(2,4,11,13=2)(5 THRU 10=3)
RECODE            TRA(1=1)(2 THRU HI=2)
COMPUTE           D1=6-D1
COMPUTE           D2=6-D2
COMPUTE           D3=6-D3
COMPUTE           D4=6-D4
COMPUTE           D5=6-D5
COMPUTE           D6=6-D6
```

```
COUNT       MISD=D1 TO D6(6)
COMPUTE     DIF=(D1+D2+D3+D4+D5+D6-6*MISD)/(6-MISD)
COUNT       MISI1=I2,I5,I6,I8,I9,I13,I14(0)
COMPUTE     I1=6-I1
COMPUTE     I3=6-I3
COMPUTE     I4=6-I4
COMPUTE     I7=6-I7
COMPUTE     I10=6-I10
COMPUTE     I11=6-I11
COMPUTE     I12=6-I12
COUNT       MISI2=I1,I3,I4,I7,I10,I11,I12(6)
COMPUTE     INT=(I1+I2+I3+I4+I5+I6+I7+I8+I9+I10+I11+I12+I13
            +I14-6*MISI2)/(14-MISI1-MISI2)
COMPUTE     A1=6-A1
COMPUTE     A2=6-A2
COMPUTE     A3=6-A3
COMPUTE     A4=6-A4
COMPUTE     A5=6-A5
COMPUTE     A6=6-A6
COMPUTE     A8=6-A8
COMPUTE     A9=6-A9
COMPUTE     A10=6-A10
COUNT       MISA1=A1 TO A6,A8 TO A10(6)
COUNT       MISA2=A7(0)
COMPUTE     ATT=(A1+A2+A3+A4+A5+A6+A7+A8+A9+A10-6*MISA1)/(10-
            MISA1-MISA2)
```

```
TRANSFORM
READ INPUT DATA
/INCLUDE DATA
FREQUENCIES     GENERAL=ALL
STATISTICS      ALL
FINISH
/*
```

Reliability of Instruments

```
//CEPU4140 JOB (CU808140),'K.P.LEUNG',TIME=(,15),MSGCLASS=A,CLASS=A
// EXEC CHECKID,PARM.PASSWORD=XXXXXX
// EXEC SPSS,PRINT=A
//SYSIN DD *
//
RUN NAME        RELIABILITY
FILE NAME       SURVEY
VARIABLE LIST   SCH,SEX,TEX,SUB,TRA,OWN,BRA1,COL,USE,BRA2,D1 TO D6,
                I1 TO I14,A1 TO A10
INPUT FORMAT    FIXED(10F2.0,30F1.0)
N OF CASES      422
INPUT MEDIUM    CARD
MISSING VALUES  ALL(0)
RECODE          SUB(1,3,12,14=1)(2,4,11,13=2)(5 THRU 10=3)
RECODE          TRA(1=1)(2 THRU HI=2)
COMPUTE         D1=6-D1
```

```
COMPUTE     D2=6-D2
COMPUTE     D3=6-D3
COMPUTE     D4=6-D4
COMPUTE     D5=6-D5
COMPUTE     D6=6-D6
COUNT       MISD=D1 TO D6(6)
COMPUTE     DIF=(D1+D2+D3+D4+D5+D6-6*MISD)/(6-MISD)
COUNT       MISI1=I2,I5,I6,I8,I9,I13,I14(0)
COMPUTE     I1=6-I1
COMPUTE     I3=6-I3
COMPUTE     I4=6-I4
COMPUTE     I7=6-I7
COMPUTE     I10=6-I10
COMPUTE     I11=6-I11
COMPUTE     I12=6-I12
COUNT       MISI2=I1,I3,I4,I7,I10,I11,I12(6)
COMPUTE     INT=(I1+I2+I3+I4+I5+I6+I7+I8+I9+I10+I11+I12+I13
            +I14-6*MISI2)/(14-MISI1-MISI2)
COMPUTE     A1=6-A1
COMPUTE     A2=6-A2
COMPUTE     A3=6-A3
COMPUTE     A4=6-A4
COMPUTE     A5=6-A5
COMPUTE     A6=6-A6
COMPUTE     A8=6-A8
COMPUTE     A9=6-A9
```

```
COMPUTE         A10=6-A10
COUNT           MISA1=A1 TO A6,A8 TO A10(6)
COUNT           MISA2=A7(0)
COMPUTE         ATT=(A1+A2+A3+A4+A5+A6+A7+A8+A9+A10-6*MISA1)/(10-
                MISA1-MISA2)
TRANSFORM
READ INPUT DATA
/INCLUDE DATA
RELIABILITY     VARIABLES=D1 TO D6/
                SCALE(DIF)=D1 TO D6
STATISTICS      ALL
RELIABILITY     VARIABLES=I1 TO I14/
                SCALE(INT)=I1 TO I14
STATISTICS      ALL
RELIABILITY     VARIABLES=A1 TO A10
                SCALE(ATT)=A1 TO A10
STATISTICS      ALL
FINISH
/*
```

ANOVA

```
//CEPU4140 JOB (CU808140),'K.P.LEUNG',TIME=(,15),MSGCLASS=A,CLASS=A
// EXEC CHECKID,PARM.PASSWORD=XXXXXX
// EXEC SPSS,PRINT=A
//SYSIN DD *
//
```

```
RUN NAME          ANOVA
FILE NAME         SURVEY
VARIABLE LIST     SCH,SEX,TEX,SUB,TRA,OWN,BRA1,COL,USE,BRA2,D1 TO D6,
                  I1 TO I14,A1 TO A10
INPUT FORMAT      FIXED(10F2.0,30F1.0)
N OF CASES        422
INPUT MEDIUM      CARD
MISSING VALUES    ALL(0)
RECODE            SUB(1,3,12,14=1)(2,4,11,13=2)(5 THRU 10=3)
RECODE            TRA(1=1)(2 THRU HI=2)
COMPUTE           D1=6-D1
COMPUTE           D2=6-D2
COMPUTE           D3=6-D3
COMPUTE           D4=6-D4
COMPUTE           D5=6-D5
COMPUTE           D6=6-D6
COUNT             MISD=D1 TO D6(6)
COMPUTE           DIF=(D1+D2+D3+D4+D5+D6-6*MISD)/(6-MISD)
COUNT             MISI1=I2,I5,I6,I8,I9,I13,I14(0)
COMPUTE           I1=6-I1
COMPUTE           I3=6-I3
COMPUTE           I4=6-I4
COMPUTE           I7=6-I7
COMPUTE           I10=6-I10
COMPUTE           I11=6-I11
COMPUTE           I12=6-I12
```

```
COUNT           MISI2=I1,I3,I4,I7,I10,I11,I12(6)
COMPUTE         INT=(I1+I2+I3+I4+I5+I6+I7+I8+I9+I10+I11+I12+I13
                +I14-6*MISI2)/(14-MIST1-MIST2)
COMPUTE         A1=6-A1
COMPUTE         A2=6-A2
COMPUTE         A3=6-A3
COMPUTE         A4=6-A4
COMPUTE         A5=6-A5
COMPUTE         A6=6-A6
COMPUTE         A8=6-A8
COMPUTE         A9=6-A9
COMPUTE         A10=6-A10
COUNT           MTSA1=A1 TO A6,A8 TO A10(6)
COUNT           MISA2=A7(0)
COMPUTE         ATT=(A1+A2+A3+A4+A5+A6+A7+A8+A9+A10-6*MTSA1)/(10-
                MISA1-MISA2)
TRANSFORM
READ INPUT DATA
/INCLUDE DATA
ANOVA           DIF,INT,ATT BY SEX(1,2)TEX(1,5)SUB(1,3)
STATISTICS      ALL
ANOVA           DIF,INT,ATT BY TRA(1,2)USE(1,2)
STATISTICS      ALL
FINISH
/*
```